

Virtual Reality-Based Instructional Media through Enriched Virtual Classroom in Microteaching

Cecep Kustandi^{1✉}, Durotul Yatimah², Rugaiyah Rugaiyah³, Bambang Budi Wiyono⁴

Teknologi Pendidikan, Universitas Negeri Jakarta, Indonesia⁽¹⁾; Pendidikan Dasar, Universitas Negeri Jakarta, Indonesia⁽²⁾; Manajemen Pendidikan, Universitas Negeri Jakarta, Indonesia⁽³⁾; Manajemen Pendidikan, Universitas Negeri Malang, Indonesia⁽⁴⁾

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Abstract

Current technological advances challenge educational institutions to create innovative learning. Therefore, one way to create innovative learning can be done by developing technology-based learning media models. This research aims to develop innovative learning in higher education using virtual reality-based instructional media through enriched virtual classroom in microteaching courses. The Integrative Learning Design Framework (ILDF) development model is used in this study. Data was collected by distributing questionnaires to media and material experts from educational technology study program to conduct product trials and in-depth interviews with five students and a microteaching lecture at *Universitas Negeri Jakarta*. The result shows that the virtual reality model can be the ease and achievement of microteaching learning objectives. This research has implications for microteaching learning models for pre-service teachers so that they can provide teaching experience with minimal risk and encourage learning innovation through educational technology.

Keywords: *instructional media; virtual reality; virtual classroom; microteaching*

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✉ Corresponding author : Cecep Kustandi

Email Address : cecep_kustandi@unj.ac.id (Jakarta, Indonesia)

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Introduction

Current technological advances challenge educational institutions to create innovative learning (Nguyen et al., 2020). Therefore, one way to create innovative learning can be done by developing technology-based learning media models (Gustiana et al., 2023; Cahyati et al., 2022; Bin-Hady & Al-Tamimi, 2021). By using technology, educational institutions will be able to improve the quality of learning for students. Innovation in learning activities is a model for educational reform that should be carried out by educational institutions, especially educational institutions that contribute to preparing prospective educators. This institution is known as *Lembaga Pendidikan Tenaga Kependidikan* as known as Institute of Teachers' Education (LPTK). LPTK have challenges in various learning contexts (Hidayah, 2013). Bearing in mind, technological developments and globalization influence learning activities become challenges for LPTK in increasing innovation to prepare superior educators.

LPTK is one of the institutions that produces educational staff such as teachers from kindergarten to upper secondary level (Zahara et al., 2023). Thus, the educational design for pre-service teachers that must be developed by emphasizes content-based and content-specific

pedagogy (Albayrak et al., 2023). Both of these designs can direct pre-service teachers to have good teaching skills. Therefore, the need for developing technology-based instructional media is needed for pre-service teachers at LPTK. Besides that, courses in LPTK must reflect the idea that learning to teach involves what is called practice in practice, meaning that the theory in lectures should be tried to be put into practice in the field and the theoretical basis of the practice that occurs in the field has been studied so that a mutually reinforcing relationship occurs. This combination of lectures and fieldwork provides the opportunity to link theory and practice. One of the courses at LPTK that provides knowledge and skills in applying learning activities is called microteaching.

Microteaching is one of courses yang mendorong para calon guru untuk bisa menjadi guru yang terampil dan professional. One way is to facilitate pre-service teachers to train their abilities to carry out learning simulations in a small scope (laboratory). This training is needed before prospective teachers hone their teaching skills in a wider scope, namely at school. Several previous studies have shown that pre-service teachers in the current technological era must have digital literacy skills and good technology use skills (Satriana et al., 2022; Van Allen & Zygouris-Coe, 2019; Lohnes Watulak, 2016). In addition, pre-service teachers must also have a variety of learning innovations that can motivate students in learning (Anderson & Justice, 2015). So, at LPTK there are microteaching activities for pre-service teachers.

In other words, universities which are LPTK use microteaching as a facility for students to gain knowledge and skills in applying learning activities (Ilhami et al., 2023). In microteaching, a group of pre-service teachers train to master basic teaching skills, practice teaching activities, and have discussions to discuss problems found (Arwildayanto et al., 2023). Pre-service teachers exchange roles, one day being a teacher and one day being a student.

From 2020 to 2022, the world of education must face the Covid-19 pandemic, which has significantly changed learning activities change very significantly (Mansor et al., 2021; Abidin et al., 2020) (Hover & Wise, 2020). The impact of the pandemic means that microteaching activities cannot be carried out directly. Therefore, microteaching activities are carried out through online learning. This condition makes pre-service teachers face difficulties in carrying out learning activities (Simamora, 2023). This is because the microteaching process should be filled with substantial practicum. The main objective of microteaching is to improve the performance of pre-service teachers in conducting teaching and learning activities through teaching skills training.

In addition, microteaching is used to reconcile teaching theory and practice to pre-service teachers. This condition is important for student teacher candidates in practicing in the laboratory. For this reason, the use of enriched virtual classrooms such as virtual reality provides new hope in learning. According to Zhang et al. (2020), virtual reality is known as interaction technology that combines the real world and the virtual world. Thus, many of the scholars' conduct virtual reality trials of learning activities both in schools and tertiary institutions (Rojas-Sánchez et al., 2023; Marougkas et al., 2023; Kuna et al., 2023). The enriched virtual classroom is in the form of virtual reality which is used as an initial introduction to the practice of learning in a classroom-like setting for pre-service teachers and students.

The enriched virtual classroom model is a classification of blended learning that can make it easier for users to carry out the learning process (Pivneva et al., 2020; Dakhi et al., 2020). Therefore, this learning model is used as an alternative to the distance learning process where activities are dominated by technology. The enriched virtual model consists of reading, cross learning, communication and debate via electronic channels. Additional sessions can be provided at schools for supporters. The emergence of virtual reality technology in the classroom which is developing rapidly and amazingly with various subversive advantages into an integrated solution for enriched virtual classrooms, has attracted the attention of both industry and education (Dong, 2016). Virtual reality which can simulate the intravenous catheter insertion procedure in a risk-free artificial environment, allows for repeated exercises,

thereby exposing students to perform simulations with various patient conditions, providing immediate feedback quickly and easily (Jenson & Forsyth, 2012).

Virtual reality is implemented in microteaching behavior skills training when dealing with fire. The results show that virtual reality can safely improve fire safety behavior skills (Çakiroğlu & Gökoğlu, 2019). Research of Darajat et al. (2022) also shows that virtual reality technology can help users see a video with a 360° rotating angle and make it easy for them to maximize public speaking techniques. Berger and Cristie (2015) explained that virtual reality is needed because its current use has spread to all aspects of life and is projected to experience significant developments in the future. Then virtual reality is a three-dimensional computer-based interactive environment that simulates reality in the form of observation activities and linkages with the field. Based on several studies above, there has been no research into an enriched virtual classroom in the form of virtual reality as an initial introductory interaction to learning practices in real school settings in an effort to improve general pedagogy and specific pedagogy in the form of observation activities and connection with the field as a novelty.

This study aims to develop innovative learning in higher education using virtual reality-based instructional media to enriched virtual classroom in microteaching courses. This research was carried out using virtual reality, which can be a medium. When the learning process uses the physical environment directly it can be costly and risky. The use of virtual reality is one way to minimize this. The use of virtual reality offers the experience of visiting a place or an object in detail. Virtual reality can also include various types of digital creations, ranging from various forms of multimedia, 3D reconstruction and so on.

Methodology

This study used research and development with Integrative Learning Design Framework (ILDF) model (McKenney & Reeves, 2014). The activity of ILDF model such as the exploration, enactment, and evaluation stages. First, in the exploration stage, researcher collected data and information, formulated learning objectives, microteaching learning analysis, and student characteristics analysis. Second, in the enactment stage, we designed and developed the instructional media by formulating specific instructional objectives, developed an assessment instrument, compiled learning strategies, selected microteaching learning materials, reviewed virtual reality existing products, created flowcharts, and creating a programming storyboard. Third, in the evaluation stage, researcher evaluated the instructional media with one-to-one evaluation by experts, one-to-one evaluation by learners, small group evaluation and field testing (see Figure 1).

Participants in this research were selected through a purposive sampling technique based on certain criteria such as having knowledge and expertise related to virtual reality and microteaching for expert media, expert materials, and lectures. Meanwhile, student participants, namely those taking microteaching courses, were adjusted to research needs. Therefore, this research collaborated with one media expert and one material expert from educational technology study program at *Universitas Negeri Malang*. Participants in this research also involved five students from the educational technology study program and one microteaching lecturer at *Universitas Negeri Jakarta*.

This research uses data collection techniques through distributing questionnaires, interviews and documentation. The interview technique is carried out at the exploration and evaluation stage one-to-one by learners and lecture. Meanwhile, documentation techniques are carried out at the exploration and enactment stages. Semi-structured interviews were used by researchers to collect data related to the need and urgency of developing virtual reality as an alternative to microteaching in the laboratory as well as input on the products used. Interview activities with students and lecturers were carried out in two stages. The first stage before instructional media is developed. And the second stage after the product is developed into virtual reality. Interview activities were carried out for 90 minutes for each participant.

The researcher used a tape recorder and small notes to record the interview process. Student participants use the PS A – PS E code to maintain the research code of ethics. The questionnaire used is an open questionnaire, that is, media experts and material experts can provide input openly. Researchers used a Likert scale for alternative answers 1-4 (Strongly Disagree - Strongly Agree). Material expert indicators include suitability of learning objectives, clarity of instructions for use, clarity of performance, and materials. Besides that, indicators for media experts include visuals, software engineering, navigation and learning design. These indicators were developed through research (Kustandi et al., 2020).

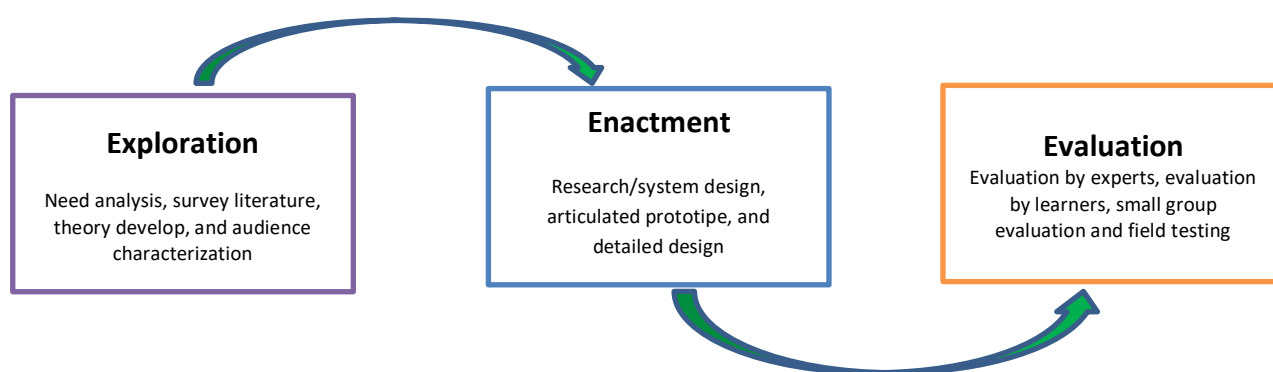


Figure 1. Research Design by ILDF Model

The results of filling out the questionnaire are then processed using feasibility percentage data analysis techniques based on Arikunto (2009). The maximum expected value is 100% while the minimum is 0%. Meanwhile, the results of interviews and documentation use data reduction, data presentation and drawing conclusions (Miles & Huberman, 1994)

Results and Discussion

Exploration

Microteaching is an alternative for pre-service teachers to develop and foster their teaching skills. Generally, this microteaching activity begins with preparing a learning plan which is then submitted to the supervisor before being presented. After that, students who do not appear during microteaching will serve as supervisors, written observers, oral observers, or students in class. Given the need to develop an enriched virtual classroom, researchers conducted a needs analysis related to this urgency. Since the Covid-19 pandemic hit, the microteaching learning process has prevented supervisors from controlling and training pre-service teachers directly. This condition makes pre-service teachers can not prepared teaching skills properly.

Microteaching learning via Zoom shows shortcomings because we have difficulty knowing the extent of our teaching skills (PS A, May, 2023). As a pre-service teacher, practical microteaching activities are very important to do. Moreover, I have never taught before in class. So, these activities need to be developed systematically and objectively (PS B, May, 2023). Based on the results of these interviews, it shows that not all courses can use media such as Zoom or other video conferences for learning. Microteaching is one of the practical subjects that students can feel and understand if they do it directly.

Therefore, the need for innovative instructional media in microteaching courses is important to develop. Pre-service teachers were directed to understand and deepen the concept of basic teaching skills. The research findings show that students have difficulty applying their abilities in practicing various approaches, strategies, and learning methods. Apart from that, students experience obstacles in the microteaching process at LPTK, including: a lack of time and opportunities to carry out simulations in practicing learning

approaches, strategies, and methods due to the high burden of learning outcomes. Students understand the material only during learning process. After the lecture is finished, the material on the steps, strategies, and learning methods that have been studied is simply forgotten by students.

Besides that, the use of virtual reality in microteaching is still very minimal. Because this model has never been used for learning. Through virtual reality technology, it will certainly optimize student potential in carrying out learning simulations. This condition creates a challenge for researchers to develop virtual reality-based instructional media that makes it easier for students to learn microteaching. And then, in practical teaching activities at school, students have not used good media, and have not utilized the internet. The use of technology in learning is limited to using PowerPoint slides to convey material.

Enactment

Based on the exploration results, researchers carried out an enactment process. There are two concepts underlying this research, namely microteaching and virtual reality. In other words, the two concepts have a relationship with each other. Microteaching consists of process material input and output. Meanwhile, learning should be fun. Thus, researchers designed relevant virtual reality-based instructional media and focused on the enriched virtual classroom. Figure 2. is the result of a prototype that researchers have tried to develop and can be used via smartphone. This is done to make it easier for developers to create application models for later testing by experts. Figure 3 shows the classroom model developed through virtual reality.



Figure 2. Prototype Enriched Virtual Classroom



Figure 3. Classroom View in Virtual Classroom Microteaching

Evaluation

The evaluation process in this research was carried out in two stages. This is because researchers need input from experts, lecturers and learners before carrying out large-scale trials. Therefore, product evaluation activities use the one-to-one expert stage.

Table 1. Material Expert

No	Indicators	Percentage	Categories
1	Suitability of Learning Objectives	78.5%	Feasible
2	Clarity of instructions for use	76.5%	Feasible
3	Clarity of performance	80%	Feasible
4	Material	77.5%	Feasible
Averages		78.1%	Feasible

Table 1 shows that the virtual reality-based instructional media design by researchers from the results of trials by material experts is feasible to use. The material expert test also reminded us that the sentences prepared to be checked again were following the EYD (*Ejaan Yang Disempurnakan/Bahasa Improved Spelling*). Apart from that, material experts wrote that the entire material was clear, aroused student interest and was in accordance with student characteristics, but added a description of the latest concepts from Microteaching to enrich the substance. In other words, in terms of learning materials, virtual reality-based microteaching is feasible to use. Apart from that, researchers also conducted trials with media experts. Table 2 shows that virtual reality-based instructional media is feasible for testing on students from a media perspective

Tabel 2. Media Expert

No	Indicators	Percentage	Categories
1	Visual	81%	Highly Feasible
2	Software engineering	78.5%	Feasible
3	Navigation	80%	Feasible
4	Learning Design	81%	Highly Feasible
Averages		80.1%	Feasible

The media experts also explained that the media being developed is interesting and has a high level of novelty. Therefore, it can be helped pre-service teachers before carrying out microteaching practices. However, further development is expected to use real humans to communicate two-way with pre-service teachers. Apart from that, researchers are expected to carry out checks using existing devices on aspects of hardware, tablet, and Android compatibility to communicate the material well. However, media experts generally assess that the product being developed follows the display elements. Thus, virtual reality-based microteaching through an enriched virtual classroom is feasible to use.

After conducting expert trials, the researchers conducted a one-to-one learner evaluation. This evaluation is carried out through interviews. The interview results show that there is ease and achievement of microteaching learning objectives through the developed virtual reality. This is because the material presented is interesting and easy to access anywhere. Moreover, using virtual reality is supported by a focus on enriched virtual classrooms. So they can understand the situation in class even though it is virtually. Besides that, microteaching material is suitable for virtual reality. In other words, the results of this interview show that the product being developed is feasible to use.

The results of this study answer the challenge of Nguyen et al. (2020) regarding technological advances that universities must face. Apart from that, this research also illustrates that apart from technological advances, pandemic events also pose challenges in carrying out learning activities. This is because the use of technology needs to be adapted to

the needs of learners. Therefore, researchers use exploration as the first step to analyze the needs of learners in microteaching learning. In contrast to Bin-Hady et al. (2021), this research offers the use of virtual reality technology for microteaching learning. So, innovation in developing instructional media is important.

This study shows that developing a virtual reality-based instructional media can supported LPTK to face challenges related to the learning context (Hidayah, 2013). This context exists in virtual reality through an enriched virtual classroom. As pre-service teachers, students can carry out learning independently and can be repeated without going to the laboratory. They can practice microteaching activities at home with the developed virtual reality. Thus, the results of this study support Zahara et al. (2023), where LPTK as an educational institution, is required to produce quality educational staff. Not only quality, but the development of virtual reality can help pre-service teachers encourage them to use technology-based learning. This is because pre-service teachers are required to have good digital literacy skills.

In contrast to Van Allen and Zygorius (2019), this research seeks to prepare pre-service teachers to have digital literacy competencies using virtual reality. In virtual reality, researchers added a guide that they could read. Apart from that, they can also practice internet inquiry skills in virtual reality developed by researchers. Therefore, the presence of virtual reality makes microteaching learning possible in its real form. Only the scale is reduced, and uses virtual glasses as aids (Çakiroğlu & Gökoğlu, 2019).

The demands on pre-service teachers after the Covid-19 pandemic are greater because they must have various learning innovations. Therefore, this research supports Anderson and Justice (2015) study that for pre-service teachers to have learning innovation and motivate students to learn, they must also receive the necessary teaching training. Thus, virtual reality helps them to have basic teaching skills in the classroom (Dong, 2016). For this reason, this research answers Simamora (2023) concerns about pre-service teachers in facing the pandemic when microteaching activities cannot be carried out directly in the laboratory. Unfortunately, this research has not been able to meet the expectations of Arwildayanto et al. (2023) related to microteaching skills that pre-service teachers must have. Bearing in mind the product development carried out has not been able to help pre-service teachers practice discussing with students.

In line with Halimah (2017), the implementation of microteaching, this study applies the cognitive stage and the implementation stage. At the cognitive stage, pre-service teachers were directed to understand basic skills through explanations in the enriched virtual classroom. Furthermore, the user will choose a class according to the learning strategy he wants to do. After entering the class, the prospective teacher will listen again to the explanation of the learning strategy and start learning activities. However, at the reverse stage it is still in the development process. This is because each pre-service teacher can only feel teaching practices as a user.

Moreover, the research offers a virtual reality model with a different concept from Pivneva et al. (2020). Virtual reality through an enriched virtual classroom can allow pre-service teachers to carry out microteaching outside the laboratory. Apart from that, this research also shows that virtual reality can be used not only by students in the fields of health, scientific science, and technology but also in the field of teacher education (Darojat et al., 2022; Jenson & Forsyth, 2012).

Conclusion

This research concludes that technology continues to develop, and the Covid-19 pandemic is challenging for educational institutions to carry out learning innovations. Microteaching, which is usually done face-to-face, can now be done through virtual reality media. This virtual reality media was developed through an enriched virtual classroom that pre-service teachers can use via a smartphone. In other words, virtual reality makes it easy for

pre-service teachers to carry out microteaching activities by simulating and modeling artificial spaces. Material experts and media experts support the development of this instructional media by providing appropriate assessments for further use and testing by pre-service teachers. Based on the assessment of media experts, this research has limitations at the implementation stage. In the enriched virtual classroom, two-way communication with pre-service teachers is not yet possible. One of the factors that become obstacles is the lack of tools used. So, in future research, researchers will work together with programming experts to carry out AI coding so that the interaction process becomes more meaningful. This research has implications for microteaching learning models for pre-service teachers, so that they can provide teaching experience with minimal risk and encourage learning innovation through educational technology.

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